

Claims

1. A method for processing a substrate which includes the step of drawing a scribe line on a mother substrate and dividing the mother substrate along the drawn scribe line, characterized in that

when a mother substrate or a small mother substrate which is a portion that has been divided from a mother substrate is conveyed, said mother substrate or said small mother substrate is held through suction of a main surface of said mother substrate or said small mother substrate using a number of suction members, each of which is provided with a suction surface, and then, all of said suction members are rotated approximately simultaneously, and thereby, the two main surfaces of said mother substrate or said small mother substrate are turned over in the upward and downward direction.

2. The method for processing a substrate according to Claim 1, wherein all of the suction members are rotated around rotational axes which extend parallel to each other in the longitudinal direction of the suction members and passes through approximately the center portion in the width in the direction perpendicular to the longitudinal direction of each suction member.

3. The method for processing a substrate according to Claim 1, characterized in that a mother substrate is divided in advance into small mother substrates in strip form, and each of the divided small mother substrates in strip form is sucked and held by any one suction member.

4. The method for processing a substrate according to Claim 2, characterized in that the distance between the axis lines of the rotational axes of the respective suction members is changed before or at the time of rotation of said number of suction members.

5. The method for processing a substrate according to Claim 4, characterized in that the distance between the axis lines of the rotational axes of the respective suction members is changed before or at the time of rotation of said number of suction members, and thereby, a mother substrate or a small mother substrate on which a scribe line is at least partially drawn is divided along a portion of said scribe line.

6. An apparatus for processing a substrate which divides a mother substrate or a small mother substrate which is a portion that has been divided from a mother substrate into unit substrates, comprising

a scribing portion for drawing a scribe line on a mother substrate or a small mother substrate; a breaking portion for breaking said mother substrate or said small mother substrate along the drawn scribe line, and a substrate conveying portion for conveying said mother substrate or said small mother substrate at least between said

respective portions, characterized in that

the substrate conveying portion has a number of suction members which are provided with a suction surface for sucking and holding a mother substrate and a small mother substrate from a main surface, and the suction members have rotational axes and means for sucking and rotating a substrate which rotate mother substrates or small mother substrates around the respective rotational axes approximately simultaneously in a state where said mother substrates or said small mother substrates are being sucked in such a manner that at least the two main surfaces of each substrate turns over in the upward and downward direction.

7. The apparatus for processing a substrate according to Claim 6, characterized in that the rotational axes of the respective suction members are parallel to each other, extend in the longitudinal direction of the suction members, and pass through approximately the center portion in the width in the direction perpendicular to the longitudinal direction of each suction member.

8. The apparatus for processing a substrate according to Claim 6, characterized in that at least one suction member has a porous suction surface.

9. The apparatus for processing a substrate according to Claim 6, characterized by having at least one suction member having a suction surface of which the size is different.

10. The apparatus for processing a substrate according to Claim 7, characterized in that the means for sucking and rotating a substrate has a portion for driving a rotational axis which rotates the rotational axis of a suction member and a portion for shifting a rotational axis which changes the distance between the axis lines of the respective rotational axes of adjacent suction members before or at the time when the rotational axes are rotated.

11. The apparatus for processing a substrate according to Claim 6, characterized in that the scribing portion further has a positioning mechanism for positioning and aligning a substrate that has been rotated by a suction member on a main surface of an adjacent table.

12. The apparatus for processing a substrate according to Claim 6, wherein the breaking portion comprises a first conveyor for conveying a mother substrate or a small mother substrate on which a scribe line is drawn, and a member for pressing a substrate which is placed in the vicinity of at least one end of the first conveyor in the direction of conveyance, and presses an end of a mother substrate or a small mother substrate that has been conveyed by the first conveyor so that the substrate protrudes from the end of the conveyor in the direction of conveyance, and thereby, breaks the

substrate into unit substrates.

13. An apparatus for processing a substrate which divides a mother substrate or a small mother substrate which is a portion that has been divided from a mother substrate, comprising a scribing portion for drawing a scribe line on a mother substrate or a small mother substrate, and a portion for conveying a substrate which conveys a mother substrate and a small mother substrate and breaks said mother substrate or said small mother substrate along the drawn scribe line, wherein

the portion for conveying a substrate has a number of suction member units, and each suction member unit is supported by a portion for supporting a unit with a mechanism for adjusting the distance between units which changes the distance between suction member units,

each suction member unit has a number of suction members with a suction surface for sucking and holding a mother substrate or a small mother substrate from a main surface, and the suction members have rotational axes and means for sucking and rotating a substrate which rotate mother substrates or small mother substrates around the respective rotational axes approximately simultaneously in a state where said mother substrates or said small mother substrates are being sucked in such a manner that at least the two main surfaces of each substrate turns over in the upward and downward direction.

14. The apparatus for processing a substrate according to Claim 13, characterized in that the rotational axes of the respective suction members of each suction member unit are parallel to each other, extend in the longitudinal direction of the suction members, and pass through approximately the center portion in the width in the direction perpendicular to the longitudinal direction of each suction member.

15. The apparatus for processing a substrate according to Claim 14, characterized in that the means for sucking and rotating a substrate has a portion for driving a rotational axis which rotates the rotational axis of a suction member and a portion for shifting a rotational axis which changes the distance between the axis lines of the respective rotational axes of adjacent suction members before or at the time when the rotational axes are rotated.

16. The apparatus for processing a substrate according to Claim 15, characterized in that the direction in which the portion for shifting a rotational axis changes the distance between rotational axes and the direction in which the mechanism for adjusting the distance between units in the portion for supporting a unit changes the distances between suction member units are perpendicular to each other.

17. A conveying mechanism for conveying a mother substrate or a small mother

substrate which is a portion that has been divided from a mother substrate when said mother substrate or said small mother substrate is processed, comprising

a number of suction members with a suction surface for sucking and holding a mother substrate or a small mother substrate from a main surface, wherein

the suction members have rotational axes and means for sucking and rotating a substrate which rotate mother substrates or small mother substrates around the respective rotational axes approximately simultaneously in a state where said mother substrates or said small mother substrates are being sucked in such a manner that at least the two main surfaces of each substrate turns over in the upward and downward direction.

18. The conveying mechanism according to Claim 17, characterized in that the rotational axes of the suction members are parallel to each other, extend in the longitudinal direction of the suction members, and passes through approximately the center portion in the width in the direction perpendicular to the longitudinal direction of each suction member.

19. A conveying mechanism for conveying a mother substrate on which a scribe line is drawn or a small mother substrate which is a portion that has been divided from a mother substrate when said mother substrate or said small mother substrate is conveyed, comprising

a number of suction member units, each suction member unit being supported by a portion for supporting a unit with a mechanism for adjusting the distance between units which changes the distance between suction member units, wherein

each suction member unit has a number of suction members with a suction surface for sucking and holding a mother substrate or a small mother substrate from a main surface, and the suction members have rotational axes and means for sucking and rotating a substrate which rotate mother substrates or small mother substrates around the respective rotational axes approximately simultaneously in a state where said mother substrates or said small mother substrates are being sucked in such a manner that at least the two main surfaces of each substrate turns over in the upward and downward direction while dividing said mother substrate or small mother substrate along a portion of the scribe line if necessary..

20. The conveying mechanism according to Claim 19, characterized in that the rotational axes of the respective suction members of each suction member unit are parallel to each other, extend in the longitudinal direction of the suction members, and pass through approximately the center portion in the width in the direction perpendicular to the longitudinal direction of each suction member.

21. The conveying mechanism according to Claim 19, characterized in that the means for sucking and rotating a substrate has a portion for driving a rotational axis which rotates the rotational axis of a suction member and a portion for shifting a rotational axis which changes the distance between the axis lines of the respective rotational axes of adjacent suction members before or at the time when the rotational axes are rotated.

22. A method for conveying a substrate, characterized in that a substrate is sucked and held from a main surface using a number of suction members, each of which is provided with a suction surface, and then, said suction members are sequentially or approximately simultaneously rotated, and thereby, two main surfaces of said substrate are turned over in the upward and downward direction.

23. The method for conveying a substrate according to Claim 22, comprising the steps of sucking and holding a substrate before processing or a substrate after predetermined processing has been carried out on at least one main surface of the substrate from a main surface using a number of suction members, and turning over two main surfaces of said substrate in the upward and downward direction.